

### **ABSTRACT OF THE DISCLOSURE**

A new detection scheme for time-of-flight mass spectrometers is disclosed. This detection scheme allows extending the dynamic range of spectrometers operating with a counting technique (TDC). The extended dynamic range is achieved by constructing a multiple anode detector wherein the individual anodes detect different fractions of the incoming particles. Different anode fractions are achieved by varying the size, physical location, and electrical/magnetic fields of the various anodes. An anode with a small anode fraction avoids saturation and allows an ion detector to render an accurate count of ions even for abundant species.